



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,961	08/31/2001	Bruno P.B. Lequesne	DP-304183	1539

7590 09/30/2003  
DELPHI TECHNOLOGIES, INC.  
Legal Staff, Mail Code: 482-204-450  
1450 W. Long Lakem  
P.O. BOX 5052  
Troy, MI 48098

EXAMINER

LEYKIN, RITA

ART UNIT PAPER NUMBER

2837

DATE MAILED: 09/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/943,961

Applicant(s)

LEQUESNE ET AL.

Examiner

Rita Leykin

Art Unit

2837

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 July 2003.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

This office action is in response to amendment filed on July 24, 2003.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 5-8, 10, 11, 14-17, 19, 20, 23-25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung US # 6,411,060 and Lajsner et al. US # 6,448,736.

With respect to claims 1, 2, 8, 10, 11, 19, 20 and 26, Jung discloses driving device for a Switched Reluctance (SR) Motor, wherein at an initial stage of starting of switched reluctance motor, microprocessor sequentially outputs a plurality of control signals, thereby aligning the rotor. Wherein, the plurality of transistors are at an ON state for a sufficient time according to the control signals, so that the rotor can be pulled to a silent pole of the stator, in other words holding position. And wherein, the microprocessor sequentially outputs the control signals in consideration of the rotational direction of the rotor after starting the SR motor, (see abstract and column 7, lines 30-48).

With respect to claims 5-7, 14-17 and 23-25, Jung does not teach excitement sequence of specifically second phase of the motor or third phase of the motor.

However, Jung teaches a microprocessor for sequentially outputting a plurality of control signals at an initial stage of the starting of the SR motor and sequentially outputting plurality of control signals according to the detected position after starting SR motor, wherein the plurality of transistor switches of the driving circuit is being switched by the plurality of control signal.

Jung teaches that operational control of the motor during starting is performed without the detecting of a phase position of the rotor. Jung does not teach subsequent operational control without position sensor. However, Lajsner et al. disclose a switched reluctance motor with a first phase and a second phase that is comprising aligning the rotor with the second phase, at a first time point ( $t_1$ ), energizing the first phase 1, monitoring an increase of the phase current ( $I_1$ ) in the first phase (1) until the phase current will reach the maximum (302), monitoring a decrease (303) of the first phase current ( $I_1$ ) until at the second time point ( $t_2$ ) the phase current ( $I_1$ ) reaches a minimum (304) and starts to increase again (305); de-energizing the first phase (1) at a third time point ( $t_3$ ) that follows the second time point ( $t_2$ ) at a predetermined time interval and repeating energizing, monitoring and de-energizing for the second phase (2) instead of the first phase (1). Hence, Lajsner et al. disclose method for controlling the switched reluctance motor based on phase current data, without use of position detector.

Hence, it has been obvious to one of ordinary skills in the art, at the time invention was made to use teachings of Lajsner et al. on sensorless SR motor control, based on current detecting, and apply this teaching to Jung disclosure of operational

Switched Reluctance motor control to drive the motor in a predetermined sequence that is synchronized with the angular position of the rotor relative to the stator.

The reason is to achieve knowledge of relative position of rotor to the stator for the operational controller for instance during a "start-up" operation.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 3, 4, 9, 12, 13, 18 and 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung US # 6,411,060, and Lajsner et al. US # 6,448,736, and McCann US # 6,075,332.

The limitations of the independent claims 1, 10 and 19 have been discussed in the paragraph above.

Jung and Lajsner et al. do not teach minimizing current or heating losses. Jung and Lajsner et al. also do not teach means for determining motor torque.

However, McCann teach that higher motor current results in lower operational efficiency and greater thermal heating. Modifying the conduction angles and providing the adequate minimum amount of required time response can achieve the greater motor efficiency. Wherein, the optimum conduction angles can be determined by using a

predictive signal processing techniques to estimate motor torque that will be commanded. McCann discloses a predictive conductive angle motor control system for the brake-by-wire application. Wherein, McCann introduces predictive techniques, to estimate the value of the motor torque request, (see column 1, lines 62-67 and column 2, lines 1-18 and column 6, lines 47-65).

Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine teachings of Jung and Lajsner et al. and McCann to provide a controlling current losses device in Switched Reluctance motors, by reducing period of application of the phase current according to the predicted torque.

The reason is to minimize current and heating losses in the motor phase.

### ***Conclusion***

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

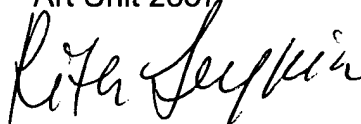
Art Unit: 2837

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rita Leykin whose telephone number is (703)308-5828. The examiner can normally be reached on Monday-Friday 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Nappi can be reached on (703)308-3370. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Rita Leykin  
Primary Examiner  
Art Unit 2837



R.L.